

THE

ANNUAL REPORT

OF THE

BOARD OF DIRECTORS

OF THE

WELLAND CANAL COMPANY,

FOR 1827.

——
PUBLISHED BY ORDER OF THE BOARD.
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ST. CATHARINES,

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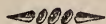
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REPORT.



IN presenting to the Stockholders the Annual Report of the proceedings of this Company, the Directors have every reason to congratulate them and the publick on the result of the last year's operations. And although they have had to contend with many difficulties inseparable from works of such magnitude, yet these have been less than might reasonably have been expected.

Although the sanguine expectations, entertained last year by the Directors, that the amount of Stock then remaining unsubscribed would speedily be taken up, have not yet been realised as far as individual subscriptions are concerned, yet the timely and effectual support afforded by the Legislatures of both Provinces during the last session of their respective Parliaments, entirely relieved the Directors from that embarrassment, which must otherwise for a time have paralyzed their exertions. The ample means thus afforded have enabled the Directors to continue their operations during the past year with increased vigour.

On the opening of the season, the Contractors for the Deep Cut, Messrs. Beach, Hovey & Ward, represented their inability to carry on the work farther at the price contracted for, and the Directors, after a full consideration of their proposal, consented to release them from their engagements, and to make preparations for re-letting that portion of the work. Preparatory, however, to entering into any new contracts for the completion of the Deep Cut, the Directors offered a reward of £125 to the person who would construct a Machine that would remove the greatest quantity of earth in a given time, at the least expense; and many intelligent men were competitors for the premium.

The best Inventions were those of Mr. Oliver Phelps, and of Messrs. Pratt & Simpson, who have used them with great advantage during the past season.

The Machine invented by Mr. Phelps, which has been generally used, consists of a wheel revolving round an axle, having one end fixed to the ground, and at such an angle as to bring the rim of the wheel upon the same plane with the slope of the road up the bank; around this wheel a rope is passed, with a hook at each end, to attach the empty cart going down and the loaded one coming up, keeping the cattle at a draught up and down—the empty team going down being generally sufficient to

bring the returning load up, with little labour to the cattle drawing the latter; thereby, in effect, reducing the ascent to a level.

The rains set in last autumn much earlier than usual; and from the stiff and adhesive nature of the clay, the work could not be prosecuted with advantage in wet weather, and the Contractor thought it most judicious to suspend operations towards the latter end of October—which, in the end, proved fortunate, as the rain continued during the whole of the following month.

The Deep Cut contained in Sept. 1825, 1,487,514 cubick yards of earth: there now remains only 371,643 to be removed; consequently, there can be no reasonable doubt that the whole will be finished in good time next season, as we have had but little more than two entire seasons to remove the great proportion already excavated.

From this to the brow of the mountain, including sections 7 to 16, (or lock No. 1,) a distance of 4 1-4 miles, the canal is finished and ready for the reception of water, with the exception of 12,000 cubick yards on section 15, which will stand over till next season. This section and No. 16, for a distance of twenty chains, averaged 20 feet of deep cutting: the excavation proved very hard; and the Directors cannot speak in too high terms of the perseverance, industry and good management of the Contractors, Messrs. Bell, Richardson, & Co. under whose immediate direction it has been conducted. This part of the canal, (viz. from section 7 to 16,) being a continuance of the summit level, contained, on commencing in the spring of 1826, 407,641 cubick yards of excavation, and 124,567 yards of embankment, which has been finished by the same Contractors, who were mentioned in the Appendix to last year's Report.

The excavation along the declivity of the mountain, comprehending the sections from 17 to 30, inclusive, and extending to the distance of 4 9-10 miles, is all finished, except what is purposely left for backing or filling in the sides of the locks.

The locks down the mountain, thirty-two in number, are in a state of great forwardness, with the exception of two; and the whole may easily be finished early in the ensuing season. This part of the canal, embracing the mountain descent, contained originally 224,556 cubick yards of earth, and 57,000 yards of rock excavation; 303,313 yards of embankment, and 33,000 yards of puddling.

The remaining part of the canal, to lake Ontario, including a distance of 5 miles, is finished and filled with water: it presents a surface of great width throughout, and affords a correct

view of the magnitude of the canal. This part required, originally, 157,566 cubick yards to be excavated, and 158,609 to be embanked. For a more particular detail, see Engineer's Report, Appendix, [A.]

Of the 2,333,706 cubick yards of earth originally required to be excavated, on this northern section of the canal, 406,553 yards now only remain to be removed; and of the 586,489 y'ds. of embankment at first required, 87,262 yet remain to be completed.

Fifteen miles of the canal will be finished by the first of June next—leaving only a distance of 1 1-2 miles to be finished, in order to form an uninterrupted communication between lakes Erie and Ontario, by way of the Niagara and Welland rivers.

This portion of the canal (from lake Ontario to the Welland) being so far advanced, and its speedy completion being no longer problematical, the Directors thought no farther delay should be allowed to intervene before the remaining section, (from the Welland to lake Erie,) was commenced; and this appeared the more necessary when it was considered, that the canal can certainly answer its object but very imperfectly, while this section remains unfinished, and that several months would be required to drain the great marsh, previous to its being undertaken. The Report of Mr. Barrett, which contains all the information relative to this part of the line, will be found in the Appendix, [B.] and the Board, for the reasons which have been mentioned, concurred in the recommendation of their Engineer, advertised immediately for proposals, and placed it under contract, to Messrs. Monson, Simpson, & Co on the 4th October, who are now employed on this part of the line, which may be worked to advantage in the winter season. On this part of the line the clearing has been nearly finished, much of the grubbing has been done, the ditches carried between three and four miles, and about 72,000 cubick yards of earth have been excavated.

During the past year the work has been conducted under the immediate superintendence of Mr. Alfred Barrett, Principal Engineer, to whom the Company are much indebted for his industry, zeal, and good management, in the laborious and responsible situation he has occupied.

The 13,400 acres of land granted to the Company, by Government, has proved to be most fortunately situated—the line of the canal running nearly through the centre of it.

Of the Capital Stock of the Welland Canal Company, consisting of 16,000 Shares, and amounting to £200,000—

Individuals have subscribed	6,893 shares,	£86,162 10
Prov. Gov't. of Upper Canada,	4,000 "	50,000 00
Prov. Gov't. of Lower Canada,	2,000 "	25,000 00
Remaining unsubscribed,	3,107 "	38,837 10
	<u>16,000</u>	<u>£200,000 00</u>

There has been actually paid in, and expended on the canal—

Eighty-one per cent. on 8,893 shares, held by the Government of Lower Canada, and by	
Individuals,	£90,041 12 6
Whole amount by Gov't. of Upper Canada,	50,000 00 0
Amount of Loan from Prov. Government,	25,000 00 0
Making, altogether,	<u>£165,041 12 6</u>

The remaining available funds of the Company consist of—

The donation from the British Government, in consideration of the free passage of Gov't.	
Stores,	£17,777 16 0
Nineteen per cent. on 8,893 shares,	21,120 17 6
	<u>£38,898 13 6</u>

It will require to finish the canal—

From lake Ontario to river Welland,	£40,000
From the Welland to Grand river,	50,000
	<u>£90,000 00 0</u>
Leaving this sum to be provided for,	£51,101 6 6
If the whole stock should be taken up,	38,837 10 0
There would only remain to be provided,	<u>£12,263 16 6</u>

The publick advantages to be derived from this undertaking are daily developing themselves, not only by the rapid improvement of the country on its immediate borders, but by the spirit of enterprise and exertion it calls forth in the inhabitants of the country more remote, who appear desirous of availing themselves immediately of all the advantages the canal is likely to afford, by improving the different streams leading into lake Erie. The connexion of those lakes, by ship navigation, will have a tendency of facilitating the improvement of the Grand river, the Thames, the Otter, and many other large and valuable streams, taking their source a great distance in the interior of the country; and, consequently, will not only increase the present trade, but create new sources, to a very great extent.

JOHN H. DUNN, *President.*

HENRY J. BOULTON,

JOHN B. ROBINSON,

COL. WELLS,

D'ARCY BOULTON,

GEORGE KEEFER,

JOHN CLARK,

Directors.

APPENDIX.

[A.]

*To the President and Directors of the Welland Canal Company,
I beg leave to Report—*

THAT on section No. 1, of the Deep Cut, of the 21,116 cubick yards of excavation that remained Nov. 11th, 1826, only 7,479 yards now remain. The whole could easily have been completed this season; but it was thought more advisable that it should be delayed until a ditch was effected through the Deep Cut, when it may be done at far less expense. Near the head of this section has been erected a guard gate, to check the rise of water in the Welland river.

On sections No. 2, 3, 4, 5, and 6, (embracing the whole extent of the Deep Cut,) there were excavated previous to the commencement by Mr. Oliver Phelps—under S. Ward, & Co. 666,694 cubick yards, paid for, as per contract, at an average price of 19 cents, \$130,812 22. Under Mr. O. Phelps, 341,490 yards, at 25 cents 6 mills, \$88,271 04. Total yards excavated, 1,008,184, at an average price of 21 cts. 7 m. making the sum of \$219,083 26.

It may be proper to mention here, that the greatest proportion of the work has been done, this season, through the deepest part of the cut.—The two northerly sections, embracing a distance of 55 chains, originally averaged 51 feet: they now average only 14 feet; consequently, there remains the least number of yards to remove from the deepest cutting; which shows that the work done has not been over-rated. It was very late in the season before an efficient force was applied to this work, which has prolonged it beyond what was anticipated; consequently, the greater part of another season will be required for its completion. No obstacles have appeared during this season's operations, to impede the progress of excavation. The banks stand remarkably well; although they have been far more exposed than heretofore, both from their increased height, and the irregular manner in which the earth has been laid on them. Measures are now taken to lay the spoil banks in such a manner as to turn all the water that falls on them to the rear, from whence it may easily be discharged into the Welland river, from the natural inclination of the land in that direction.

At the foot of this cut a draw-bridge has been erected over the canal, at an elevation of 35 feet above the surface of the water. Three stone culverts have been built on sections No. 10 and 13, containing 649 perches of masonry.

Three waste-weirs and flooms are constructing on the summit level, between the Deep Cut and section No. 17: one at Mr. Hall Davis', on section No. 9; one at the Beaverdam, on section No. 14; and one at the head of section No. 17, above lock No. 1, for the purpose of discharging the surplus water in the canal, and passing off any additional quantity in the spring and fall floods, by the valley of the ten mile creek. It will be necessary to cut a small ditch to lead the main branch of the Beaverdam creek into its eastern branch, at the time of high water; by which we have the controul of all the water on this summit, and can, at pleasure, either discharge it from the canal, or lead it into it. Those waste-weirs, instead of stopping the water from the original branches, as some persons

now apprehend, will always afford an additional supply of water to those streams; at the same time they regulate any excess caused by floods or freshets, as formerly; and will not only be useful to the canal navigation, but highly beneficial to those possessing hydraulick advantages on any of these branches. The waste-gate on section 9, will be placed five feet below bottom level, for the purpose of scouring out the Deep Cut, or drawing off the water, if at any time it may be found necessary.

The embankment on section No. 9, has settled since it was accepted, considerably, occasioned by its being composed of light soil, and made in the driest part of the season, principally by wheel-barrows: 3,355 cubick yards of earth have been found necessary to raise it to its original height. All the other banks on this summit have been constructed with teams and carts: they appear well packed, and remain permanent.

The guard lock at the Welland, on this section, is 40 feet wide. There will be four bridges on this level, which are now in progress, and have 40 feet span; so that steam-boats of any dimensions now built on lake Erie, may reach the grand reservoir at the mountain descent, which is of sufficient dimensions to contain any quantity of lumber, or any number of vessels, for a great length of time.

From lock No. 1 to St. Catharines, thirty-two locks are located, in a distance of four miles and 72 chains—3 of which are finished, 12 average three-quarters, 7 one-half, and 3 one-third; the remaining two are not laid, but the timber is in readiness to place them early in the spring.—We have seven rock foundations in the line; the remainder, without exception, are bedded in a hard, tough, blue clay. Most of the contractors have met with serious difficulties in sinking those pits, the excavation of which having invariably proved exceedingly hard. We have met with only 57,000 yards of rock excavation, on sections 19 and 20; which, in a distance of the length of this canal, with so great a descent on the face of a mountain, is a most remarkable circumstance.

From the head of lock No. 1, we carry a ditch for surplus water into the level between locks No. 4 and 5: from the head of No. 5, to between 17 and 18: from the head of No. 18, to the level between 27 and 28—affording an abundant supply of water for hydraulick erections, to any extent, without causing any perceptible current in the canal. In addition to which, waste-weirs are constructed at locks 19 to 31, between which there are large and spacious natural basins or reservoirs, formed by a ravine through which the canal descends.

From St. Catharines to the harbour, we have three waste-weirs and three locks, which are finished, and the water has been let in for some time. In the upper two, waste-gates have been constructed during the last season, of sufficient dimensions to controul the surplus water. They have been thoroughly proved this fall, together with the locks, and answer in every respect the purposes for which they were intended. The middle waste-weir was carried off on the first rising of the water last spring, owing to the embankment being frozen, and not having time to settle. Two lock gates were also carried off, on first lock, partly by accident, and not being made sufficiently substantial.

The piers at the entrance of the harbour have not yet been entirely filled with stone: nevertheless, they have resisted the force of the waves for two seasons; and no doubt can be entertained of their efficacy or durability. By the removal of 320 yards of earth from between the piers, nine feet of water will be afforded at all times; and if found desirable or necessary, twelve feet may be obtained by the use of a machine for scraping the bottom, which has proved highly beneficial.

The following abstract will show the number of yards excavated, from the Deep Cut to lake Ontario, together with the number required to be removed to finish the same:—

Work done on Deep Cut, since commencement, is as follows:

Chopping and Clearing,	-	-	-	70 acres.
Grubbing,	-	-	-	30 "
Excavation, (including section 1 and reserve,)	1,115,371	cubick	yards.	

From Deep Cut to Lake Ontario:

Chopping and Clearing,	-	-	-	91 3-4 acres.
Grubbing,	-	-	-	50 3-4 "
Excavation,	-	-	-	818,751 cubick yards.
Embankment,	-	-	-	499,227 "
Puddling,	-	-	-	33,291 "

Making a total of 161 3-4 acres of chopping and clearing—80 3-4 acres grubbing—1,934,622 yards of excavation—499,227 yds. of embankment, and 33,261 yds. of puddling.

ALFRED BARRETT, *Principal Engineer.*

St. Catharines, January 1st, 1828.



APPENDIX.

[B.]

To the President and Directors of the Welland Canal Company,

HAVING finished the survey of the Southern Section of the Welland Canal, I beg leave to submit the following REPORT—

No. 1. The table land has been levelled over, from the forks of the Welland to Grabel's bay, on lake Erie—distance, five miles—average cutting, 15 feet. This route presents but few difficulties. A canal and safe harbour may be constructed at an expense not exceeding £85,000.

No. 2. Northern route. In consequence of the deep cutting on the line explored by Messrs. Clowes & Rykert, it was thought advisable to try for a more favourable one to the north. Messrs. Lapham & Gooding, assistant engineers, received instructions to make an examination from the forks of the river Welland up the valleys of Beser's and Kelley's creeks, crossing the northwest arm of the Wainfleet marsh, to Broad creek, near its entrance into the Grand river. This route, in making lake Erie the summit, will cost £53,230. The whole distance is 11 miles and 65 chains, of which only four miles are in the marsh—average cutting varies from 8 to 10 and 15 feet.

No. 3. Middle route. This is the one formerly traced out by Messrs. Clowes & Rykert, which has been carefully re-surveyed. Commencing at the forks of the Welland river, it passes up the valley of Mill creek; terminating in Broad creek, at the same point with the above. Whole distance, 12 miles; 9 of which lies through the lower part of the upper marsh—average depth, 8 to 15 feet—cost, as per estimate, £61,934 5.

Several routes have, also, been examined, with reference to a feeder from the Grand river, which may be brought into either No. 2 or 3, by raising the level 3 feet, placing two additional locks, constructing a dam across the Grand river 17 miles above the junction of the canal with the same, 3 feet high, and placing a lock therein. The estimated cost is £35,000—whole length of the feeder, 17 miles. The difference of expense will not be material, on either of the foregoing routes. But in making the Grand river the summit, the object of draining the marsh would, in a great measure, be defeated: the surface of water in the canal would be too near the level of the ground to admit of it.

The three routes, together with the feeder, stand thus:—

No. 1.	5 miles in length,	estimated cost, £35,000
No. 2.	11 miles, 65 chains,	do. 53,230
No. 3.	12 miles,	do. 61,934

By bringing a feeder for either of the two last routes, the estimate will be only £35,000. They are nearly equal in length, and the cutting shallow; consequently the estimates do not vary materially.

In route No. 1, you will gain a distance of seven miles cutting, besides shortening the canal 9 1-2 miles, and partially draining the marsh; but will entirely lose the object of effecting a junction with the Grand river—as from 15 to 20 miles of a difficult lake coast will intervene, rendering the navigation at all times hazardous. Besides, you approach so near point Abino, that danger may be apprehended from obstructions by ice from the Niagara river—reasons, in my opinion, fully sufficient to abandon the route.

In route No. 2, a saving of £8,704 5 in the construction of the canal, will be effected; the marsh will not be drained, and not one mile of it will pass through the company's land: the difference in the distance being only 15 chains, is of no material consequence. The feeder will, likewise, produce a saving on either route, of £18,230. The objection to it is, in supporting or maintaining 17 miles of a feeder, two additional locks, and not draining the marsh; which, in my opinion, besides the difficulty and obstruction of the navigation, is more than equivalent to the additional expense of a thorough cut.

Although route No. 3 is the most expensive, it has a decided preference, and will be the most advantageous one for the board to adopt. It will be seen, by a reference to the map, that the company's lands lay on either side of it, throughout the township of Wainfleet: it passes through the lowest part of the marsh; will effectually drain the lands on its borders, and greatly enhance their value.

The connexion of the Grand river with the Welland, by a thorough cut, will offer an important feature in the accomplishment of this canal, by avoiding any ascent from lake Erie through the peninsula, besides connecting a country bordering on the Grand river, the commodities of which, if transported by the lake shore, (as they will be,) principally in boats and rafts, would be attended with great risque; and it is a question whether, in a few years, it would not be equal to the additional expense of this route.

This section of the canal being generally covered with water, and lying on so long a level, will require, under the best of management, a long time to drain it so that a suitable number of men may be employed to finish it in a reasonable time. We have not been able to survey it this season, before the present month; therefore, no time should be lost in placing it under contract, in order to take advantage of the winter's operation; otherwise another entire season will be lost. There will be no difficulty in draining it; but as the work can only proceed from the two ends, it will be a slow operation.

I beg leave to call the attention of the board to the following plan, on which this section may be completed for a much less sum, at the same time it comprises every advantage of the thorough cut, with the exception of a rise of five feet, and passing two additional locks.

The Grand river is a perfect level for twelve miles into the interior, at which distance the river is governed by the rise or fall of the lake: there are extensive marshes on either side, which are, from the above cause, alternately wet and dry, and can never be reclaimed, without incurring an expense far beyond their value.

By damming this river near its mouth to the height of five feet, and placing in a lock, we avoid five feet of excavation from the bottom of the canal, for 10 miles; the saving of which will be as per the accompanying estimate. This plan may, however, be adopted at any time the ensuing year, if thought advisable.

The course of the river may be diverted from its present channel, and the danger of filling up the harbour as suggested by Capt. Hall, removed: the marsh become healthy, by rendering the water stationary; and would be far more likely to *make* land, from the deposit brought down the stream, than in its present situation.

Should the board think proper to adopt the measure of damming the river, and raising the level, as above proposed, there will be made a saving in excavation through the marsh, of - - \$130,320

On the other hand, the cost of the brush dam. and

ship lock through it, will be - - \$10,230

One additional lock, - - 3,000

To pay for damage done to lands, (if any,) 4,000

17,230

Which, deducted from the foregoing, leaves - \$113,090

This cut may be lowered at any future period, during the winter season, and the dam remain or not, as may be thought most advisable.

The mouth of Grand river and Mohawk bay have been examined. The estimated expense of the latter is £5,050; additional length of canal, two miles: will cost £24,775—total, £29,825. This bay, with the exception of the difficulty in approaching it from the canal, is well calculated for a harbour: it has a sufficient depth of water across the bar; affords good anchorage, and is protected against the prevailing winds by a projection of high land.

I would, however, recommend the mouth of the Grand river, where a saving of expense will be made, in the aggregate, of £24,525. A safe harbour may be formed here, by the construction of two piers, the expense of which, embracing the towing-path to Broad creek, will be £5,600. There is no formidable difficulty in constructing this harbour, which will be as extensive as may be desired, affording moorings for any number of vessels.

Before closing my report, I will venture to make a remark, which may be considered irrelevant to the subject; nevertheless, it is of publick importance. The Cranberry marsh contains about 30,000 acres of land: it is inclosed by a small rim of land, elevated from 2 to 3 feet above its surface; has several small outlets, not sufficient, however, to drain it. By constructing the canal through it, as proposed in route No. 3, a very valuable tract of land may be reclaimed, on part of which there is a heavy growth of ash, oak and maple timber, the remainder is a thicket of small brush, and open marsh: the top soil, from 4 to 5 and 6 feet, is a rich vegetable mould intermixed occasionally with sand, resting on a bed of clay, which causes the water to remain on its surface, for so great a length of time.

This immense tract can be effectually drained, by cutting a ditch through between lots No. 17 and 18, where the marsh is only one mile wide, and can be led into Mill creek; then by cutting a drain into Lyon's creek, in Crowland, a few miles above the Deep Cut, leading into the Welland river, one mile from its mouth; again, at Savage's mill, and at Hooper's creek, leading into lake Erie. These outlets would effect the draining of the marsh, which, in its present state, is a publick nuisance; but which, at a very moderate expense, would become as valuable land as any in America.

ALFRED BARRETT, *Principal Engineer.*

St. Catharines, Sept. 1, 1827.